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ABSTRACT

This document contains eight papers by American participants in the U.S.-U.S.S.R. Seminar on Access to Library Resources through Technology and Preservation: (1) "The Automation of Libraries and Information Services in the United States" (Richard De Gennaro); (2) "Databases: Issues in the Bibliographic Control of Information in a Computer Environment" (Henriette D. Avram); (3) "The Preservation of Knowledge: Strategies for a Global Society" (Patricia Battin); (4) "Library Cooperation: Prospects for International Action" (Susan K. Martin); (5) "Regional Conservation Centers in the United States" (Ann Russell); (6) "New York State Program for Conservation and Preservation of Library Research Materials" (Joseph F. Shubert); (7) "Microforms and Brittle Books" (Margaret M. Byrnes); and (8) "Library of Congress Preservation Office Deacidification Talk" (Peter G. Sparks). (MES)

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Papers by U.S. Participants

ACTL

US-USSR Seminar on Access to Library Resources through Technology and Preservation

5-8 July 1988, Washington, D.C.

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US-USSR Seminar on Access to Library Resources through Technology and Preservation, 5-8 July 1988, is an activity of the US-USSR Commission on Library Cooperation of the American Council of Learned Societies and the Library Council of the USSR, administered in the United States by the International Research and Exchanges Board (IREX). The seminar is sponsored by the American Library Association (ALA), and held in cooperation with The Library of Congress.

American Library Association
Chicago, Illinois

List of Papers by U.S. Participants

Richard De Gennaro

Henriette Avram

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The Automation of Libraries and Information Services in the United States
by

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General Session I
Automation of Libraries and Information Services in the United States
Tuesday, 5 July 1988
13:30—15:00

THE AUTOMATION OF LIBRARIES AND INFORMATION SERVICES IN THE UNITED STATES

by
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The New York Public Library

My assigned subject, automation of libraries and information services in the United States, is broad and complex. I could deal with it in a descriptive way and tell you a lot of things about library automation that are irrelevant to your world and your concerns. Instead, I have chosen to deal with the subject in an interpretive way. I will give you some broad perspectives on the way our use of technology is changing the nature of libraries and information services in our society. I will begin by describing how technology is democratizing access to library resources. I will conclude by describing the way technology is expanding the information marketplace and changing the library's role in it.

Technology and the Democratization of Access to Library Resources

When I started my career at The New York Public Library thirty years ago, the stock-in-trade of research libraries consisted of books, journals, newspapers, and manuscript materials. The principal means of accessing the collections was the library's card catalog. The only machines in use were typewriters, telephones, photostat machines, and some primitive microcard and microfilm readers. Those who wanted access to library materials had to come to the library and either use them in the building or borrow them for home use where that was permitted. If a library did not have what the patron wanted, he either had to send for it on interlibrary loan, which was a long and uncertain process, or he had to find out where it was and travel to that library to use it. There were no copying machines. Copying was done by the user in longhand or on a typewriter. Libraries were the only source for back files of books and journals and other research materials. This is why it was so important for them to have large local collections and why the value of a library was measured largely by the number of books in its collections. The New York Public Library took great pride in the comprehensiveness of its collections, its free access, its long hours of service. Until 1960 it was open every day of the year from 9 AM to 10 PM.

New technology was first introduced into libraries in the 1950s. One of the first and most important advances was the introduction and widespread use of microfilm as a means of expanding the resources of libraries. Microfilm had been used in libraries since the 1930s, but it came into its own in the 1950s with the development of a variety of new and improved automatic cameras, processors, and printers. Microfilm was a form of republication that made available to libraries materials they could not otherwise acquire. It also enabled--for the first time--such large collections as an entire run of a newspaper or a manuscript archive to be lent by one library to another.

A combination of microfilm and the Xerox Copyflow process came into use in the early 1960s and provided a means for the economical reproduction and publication of card catalogs by photographing them twenty-one cards to a page and producing them in book form. The G. K. Hall Company pioneered this process and specialized in making book form catalogs out of card catalogs. This process made possible the wide dissemination of catalogs of the holdings of various special collections which, in turn, helped to make them accessible to scholars at a distance. The next best thing to having one of these special collections in one's library was to have a printed book catalog of that collection. The purchase of these catalogs by aspiring research libraries became quite commonplace in the 1960s. The complete holdings to 1972 of the Research Libraries of NYPL were published in 800 volumes and purchased by research libraries all over the world.

Further advancements in photographic and printing technologies reduced costs and made it possible for publishers not only to produce catalogs of these materials but also to reproduce and republish the text of the materials themselves. Thus we had collections of Spanish plays, collections of French revolutionary documents, the Kress collection of the history of economics, and the Short Title Catalog of Books Printed in English in the Sixteenth Century. This new technology allowed libraries for the first time to acquire entire collections of fully cataloged materials. Scores of instant research libraries came into existence as colleges for teachers and other small colleges and universities were transformed into full-scale state universities during the expansion of higher education in the late 1950s and 1960s. The growing use of reprographic technology for republication of library materials was an important step in the process of using technology to facilitate and equalize access to library resources.

Another major development in the mid-1960s was the introduction of the Xerox 914 machine. The Xerox machine, more than any technological advance to date, revolutionized the way libraries were used and made it possible for users to use library materials beyond the library's walls. It enabled users to make a copy of a document in a library and to own and use it in their homes and offices. The Xerox machine also made it possible to write to a library and receive a copy of a document that a library owned and use that document at a distance. It was no longer necessary for scholars to bear the heavy costs of travel to distant cities to consult materials that their libraries did not own. With this development a library's collection could be viewed as a source for making copies of documents in addition to being a place for reading and consulting them. Libraries became publishers of single copies on demand.

During this same decade a number of commercial vendors, most notably University Microfilms, Inc. (UMI), made a thriving business of producing and selling microfilm copies of research materials to libraries. This type of firm borrowed originals from one library, made and kept a master archival film, and sold copies to other libraries. UMI started with dissertations, expanded into newspapers and journals, and finally got into individual monograph titles. It now has one of the largest and most comprehensive collection of research materials on microfilm and is a major player in the document delivery business, not only selling to libraries but also competing with them. The clear advantage that vendors such as UMI possess is the ability to concentrate on the profitable part of the document supply business and use libraries of record as their source of supply.

Another significant advance in the 1960s was the introduction of the computer into library and information activities. By the early 1970s, the National Library of Medicine, System Development Corp., and Lockheed were all squarely into the online bibliographic search business. These online database services made vast quantities of up-to-date information about new publications readily available to libraries and users at reasonable prices. Availability of online searching and access was another major step in the process of making those collections and information about library collections widely available. It was a logical continuation of the same trend that the published book catalog started a decade earlier.

Large and flexible online union catalogs of the holdings of thousands of library collections were made widely available in the late

1970s with the emergence of such major bibliographic utilities as OCLC and the Research Libraries Group's Research Libraries Information Network (RLG/RLIN). As part of their bibliographic systems, these utilities began providing electronic mail services for ordering and communicating information about interlibrary loans online. These online systems greatly facilitated and increased the volume of interlibrary loan and made effective resource sharing a practical reality. Interlibrary loan offices are now being equipped with telefacsimile transmission and receiving devices, adding another capability to what is or should be one of the most electronically sophisticated units of a library.

The next major advance in this march of technology promises to be the widespread use of CD ROM and other forms of optical and video disk systems in combination with powerful micro-computer systems. This new optical disk technology will not supersede the existing archives of microforms, but it will probably supersede film as the medium for making and distributing new comprehensive collections of research materials in the years ahead.

The new optical disk technology will make possible the storage, retrieval, communication, and manipulation of vast quantities of research resources in electronic form. And the availability of information in this form, along with the availability of information in distant online databases, will transform the way libraries operate and provide resources to their users in the next decade. In the future, the size of a library's collection of conventional materials will matter far less than it does now or than it did in the past. The question is no longer how many volumes a library has, but how effectively the library can deliver needed resources from a wide variety of sources to users via the new technology. The emphasis is shifting from collections to access. The new technology will not make existing collections of books and journals obsolete and unnecessary, but the collections will no longer be the only or even the primary resources of the library of the future. In this world of electronic resources, the relative advantage that a scholar now has at one of the large established research libraries is significantly diminished.

The new information technologies are democratizing the availability of research resources. I am not suggesting that the libraries that were rich in the past will be poor in the future. For the same reasons that the major research universities were willing and able to amass and maintain enormous libraries, so in the future they will have the resources and the incentive to provide access to vast quantities of information in electronic form. Nevertheless, the new information

technologies provide a new beginning and a new opportunity for all libraries to compete.

The vast retrospective collections of printed materials in the old libraries will be both an asset and a liability in the electronic future. They will be an asset because they will become increasingly rare and important and will constitute the source for the compilation of collections on optical disks. But they could also be a liability because those institutions will have a heavy responsibility for housing, preserving, and providing access to those important archival collections.

In sum, the major technological development of the 1950s was the use of microphotography, that of the 1960s was the use of xerography and computers, that of the 1970s was online computer systems, telecommunications and networking, and that of the 1980s microcomputers and optical disk systems.

The principal effect of technology on libraries over these four decades has been to bring about a revolution in access to library resources by users. Technology is making the resources within the library available beyond its walls, and the resources beyond its walls available within the library.

The Changing Information Marketplace

In the preface to the 1983 reprint edition of his classic, *Automation,* John Diebold outlines three stages of automation. In the first stage you automate what you did yesterday; in the second stage you find that what you do changes; and in the third stage you find that as a result of these changes, the greatest change of all occurs, and that is a transformation of society.

Putting this into a library context, we could say that in the first stage of library automation we automate the library's operations, through local efforts and by forming utilities and cooperatives to share technology and bibliographic resources; in the second stage libraries take on new and different functions; and in the third stage the changes brought about by the first two stages transform the library's environment and redefine the way it performs its mission.

Diebold's three stages can also provide a frame of reference for the development of the information industry. For example, in the first stage

existing information vendors such as Chemical Abstracts Service, BIOSIS, and Engineering Index, automate their data collection and publishing operations; in the second stage they and a growing number of new vendors begin offering new online and full text services; and in the third stage the way in which information is produced, marketed, and used in our society is totally transformed. Of course, these stages do not happen in a neat progression; they overlap, and it is difficult to distinguish clearly the boundaries betwen them. Libraries and information services are beginning to move from the first to the second stages of automation.

An important aspect of the transformation is a blurring of distinctions between commercial and not-for-profit information suppliers, between vendors and libraries. The pressures of the technology-based information marketplace give rise to a growing comnpetition between and among the various information suppliers. Library cooperatives create computer networks and utilities to take advantage of technology, and in response to financial pressures these not-for-profit organizations begin to compete with each other and with commercial vendors in the market place. OCLC, RLG, WLN, Utlas, and other library cooperatives are compelled by economic realities to compete with each other for business and customers. OCLC has effectively put the Library of Congress out of the card distribution business. It is now marketing an integrated library system, the LS/2000, in competition with other vendors of turnkey library systems. In addition to the commercial vendors of library systems, several universities and a number of public libraries are marketing systems that they developed for their own use. It has become commonplace for libraries to exhibit their own systems at conferences to publicize their accomplishments as much as to seek possible buyers. Cooperatives are in competition with other cooperatives, not only for members, but also in selling particular services such as cataloging, interlibrary loan, and searching.

The growing use of technology is beginning to erode the free library ethic. Libraries have been compelled to begin selling certain high-tech services to their users beginning with Xerox copies in the 1960s and online search services in the 1970s. In the 1980s they will be selling access to online information and a growing number of other expensive high tech services. Some libraries have established semiautonomous reference and information services to facilitate the sale of services to business and industrial users.

Libraries are being forced to compete with each other and with commercial information brokers for a variety of library and document delivery services. Chemical Abstracts Service and University Microfilms International have entered the document supply business in a serious way. They are competing not only with similar services provided by the British Library Document Supply Centre, but also with the OCLC and RLG interlibrary loan networks based on the collections of conventional libraries. The role that conventional libraries played (with considerable reluctance) as the sole or primary source of interlibrary loan or document supply twenty years ago in the pre-electronic age is being taken over by a variety of other information vendors in the new competitive information marketplace. What was a burden to research libraries has become a profitable commercial opportunity to the new vendors. The market demand for documents has increased enormously in the last twenty years, and while the number of library transactions is increasing, the market share of the new vendors is increasing far more rapidly.

Technology is transforming the library and information scene and it is no longer possible to make clear distinctions between the commercial and the not-for-profit sectors. Moreover, a large proportion of the exhibitors at a major American Library Association convention today are high-tech companies that did not exist twenty years ago. In the pretechnology days, we could tell the good guys from the bad guys, that is, the virtuous not-for-profits from the greedy commercial vendors. But it is not so easy anymore. Under its not-for-profit cooperative guise, OCLC has emerged as one of the most aggressive and profitable competitors in the marketplace.

If the libraries and the library utilities are beginning to behave like commercial vendors, the commercial vendors are, in turn, beginning to behave like cooperative not-for-profit organizations. In this interesting blurring of roles, we see companies forming user-groups and advisory boards and entering into joint development arrangements to elicit the ideas and cooperation of their valued customers. We see business people writing papers and contributing their time and expertise to serving on committees and boards without pay. And we see companies sponsoring a variety of useful functions and activities in the library and information arena. On another level, we see companies like IBM, AT&T, and DEC contributing millions of dollars worth of equipment to universities. And we see universities selling their research and development capabilities to the Fortune 500 corporations.

All this commercial and competitive activity on the library scene started with the use of new technology in the 1960s. The way libraries reacted to these forces over the last three decades can be summarized in three words: *autonomy*, *cooperation*, and *competition*. Diebold is right. Technology is transforming not only our library and information environment, but our entire society.

The trends I am describing in the library and information field are parallel to and part of the major economic, social, and political trends of the last two or three decades. We have seen the relative stability of the 1960s give way to the volatile changes of the 1970s and 1980s. We are experiencing a number of historic swings in our society. Government is out, business is in; welfare is out, self-reliance is in; central is out, local is in; free is out, fee is in; cooperation is out, competition is in. I am not saying that all these changes are desirable, but they are happening, and the reason they are happening is attributable in large part to the high-tech revolution that began in the 1960s.

Some technologists and prophets of the information age are predicting that information technology will put libraries out of business. But the evidence is that technology is, in fact, putting libraries into business, for better or for worse. Technology is bringing a profusion of new players into the library and information marketplace. Before technology, libraries were the major, sometimes the only, sources of scholarly information. Libraries continue to grow in importance and to serve a vital function, but their relative share of the expanding information market is diminishing.

Conclusion

Now I want to return to my starting point and summarize and conclude. When I became a librarian thirty years ago libraries were stable and conservative and change came slowly, if at all. Publishing was the other leg of the information industry and it was just as stable and conservative as the library field. By the 1960s, with the introduction of the new information technology and the expansion of higher education and the knowledge industries, everything began to change and at an ever-accelerating rate. Libraries and traditional publishers had to make way for and share the field with a vigorous and rapidly growing commercial information industry.

At the beginning of this era, our field was characterized by stability and continuity. Now it is characterized by change, discontinuity, and opportunity. We are entering a new era and the only way libraries can conserve what they have built in the past and perform their vital mission in the future is by innovating.

As usual, Peter F. Drucker says it best. He says: "In a world buffeted by change, faced daily with new threats to its safety, the only way to conserve is by innovating".

Databases: Issues in the Bibliographic Control of Information in a Computer Environment by

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General Session II
Databases: Issues in the Bibliographic Control of Information in a Computer Environment
Tuesday, 5 July 1988
15:45—17:00

DATABASES: ISSUES IN THE BIBLIOGRAPHIC CONTROL OF INFORMATION IN A COMPUTER ENVIRONMENT

(A Presentation at the U.S. - U.S.S.R. Seminar on Libraries, July 6, 1988)

by Henriette D. Avram
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Introduction

The development of databases has steadily increased over the last twenty years. Movement toward automation has touched virtually every enterprise in developed countries resulting in the appearance of many issues to go hand and hand with the new technology. Some of these issues are new; others are not and have been debated for years in a manual environment.

My interpretation of the title of this session "Databases: Issues in the Bibliographic Control of Information in a Computer Environment" centers upon the word "issues" and is derived from my own ideas as to what constitutes an "issue." Consequently, I have chosen not to discuss the technical aspects of organization and storage, which although I consider fascinating and with considerable implications for ease and speed of update, quality and quantity of retrieval, ease of programming, etc., are outside the scope of my presentation. I hope my colleagues from the Soviet Union agree with me and if not, bear with me.

I shall concentrate in this presentation on bibliographic databases and in particular, two kinds: the machine-readable version of a library catalog representing the items in its collection and the database maintained by a bibliographic utility. The latter is a resource database of bibliographic records, contributed to by many organizations and which is used by a library to select a record for inclusion in its own catalog. This function of the bibliographic utility is known as shared cataloging or

resource sharing. The issues that will be described will be both national and international in nature.

Standards

Libraries have a tradition of resource sharing as evidenced by long standing programs of exchange, availability of bibliographic data in printed card and book catalog formats and interlibrary loan. Thus, it was natural that almost two decades ago, under the auspices of the International Federation of Library Associations and Institutions (IFLA) a program, Universal Bibliographic Control (UBC), was initiated. The goal was to produce cataloging data for an item in machine-readable form thoroughly and accurately and as soon as possible in the country of origin by the agencies responsible for the national bibliographies. This data should be made available for use worldwide.

In order to work toward this goal the national bibliographic agencies, the organizations principally responsible for the cataloging output of the national imprint, have been involved since the 1960s within IFLA and the International Organization for Standardization (ISO) in establishing standards to make this data exchange efficient and cost effective. What was envisioned was an international system whereby the national agency of each country would be responsible for the international exchange of data and the distribution of foreign records to the library and information community within its country.

It was assumed that the institutions involved would strive to follow international standards and therefore the resultant records could readily be used by the recipient institution. Almost all producers of bibliographic records in machine-readable form do use the ISO 2709 record structure and the American Library Association character set for roman alphabet

languages and many follow the International Standard Bibliographic Description (ISBD), three major steps forward. It was the acceptance of these three standards that encouraged the development of UNIMARC as an international exchange format.[1] But beyond these three, there has, except for a few instances, not been much progress in the adoption of worldwide bibliographic standards.

There is still no internationally accepted cataloging code. Even with the adoption of the Anglo-American Cataloging Rules (AACR) by many countries, the options available in the code as well as national rule interpretations create many differences in the cataloging practices of national bibliographic agencies. These differences in turn cause differences in the content of the format.

What does all this mean to the recipient organization, e.g., the Library of Congress (LC) in the United States? To date, LC has concentrated on the distribution of foreign records to the U.S. library community, rather than loading them for internal LC use. Therefore, the lack of standardization in the data content of the record means a tailor-made set of specifications and/or a tailor-made program (depending on whether the record is in a national MARC format or a UNIMARC format) for each country's records to translate them to the USMARC format for distribution to the U.S. library community. It means for records to be used within the Library of Congress, modification to each record to make it conform to AACR 2 as adopted in the United States. To bibliographic utilities such as OCLC (Online Computer Library Center) or RLIN (Research Libraries Information Network), it means mounting records which bear from little to almost no resemblance to

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[1]UNIMARC is based on the standard ISBD uniquely representing an item. The access fields, names and subjects reflecting national practices, may or may not be used by the recipient organization.

the cataloging practices of American libraries and therefore, must be modified by each member of each utility system over and over again. In some cases, when LC also catalogs a foreign book, the LC record may duplicate the foreign record--and may or may not be recognizable as a duplicate for the initial contribution and so we have two or more bibliographic records for the same item. How then does one take advantage of the machine-readable records of other countries to build a cost effective database?

In order to demonstrate clearly these difficulties, I had LC staff analyze 1) a copy of Bibliograficheskoe opisanie dokumenta [Bibliographic description of documents] ... (1984), as the official Soviet standard for rules of bibliographic description based on ISBD principles provided by the All Union Book Chamber, which we understand has been incorporated into the revised Soviet cataloging code, Pravila sostavleniia bibliograficheskogo opisaniia (1986) and 2) a copy of Kommunikativnyi format: struktura bibliograficheskoi zapisi i elementov dannykh na magnitnoi lente, [Communications format: structure of the bibliographic record and data elements on magnetic tape] (1978). The results are briefly described below:

1. Cataloging code and practices - The analysis of the Soviet cataloging code included a comparison with U.S. practices. Although a more detailed study of both codes would be required for a completely valid comparison, the analysis did reveal many differences in the choice and form of headings. More surprising are the differences in the bibliographic description. We expected our analysis to yield indications that the Soviet code followed the ISBD more closely and therefore records created by applying the code would be more compatible to international exchange. But it appears that the Soviet cataloging code has only followed the ISBD to a certain extent.

2. Format - The MEKOF (MEzhdunarodnyi KOmmunikativnyi Format),

translated as the International Communications Format, is a national standard approved in 1985. The structure of the machine-readable record is not fully described in the MEKOF standard but reference is made to another Soviet standard, GOST 7.14-84. LC only has available the 1978 registration of GOST 7.14 and it was this document that was used in the analysis.

The MEKOF format is structured like the UNIMARC format and many fields are patterned after UNIMARC fields but no stringent effort appears to have been made to make data elements compatible with UNIMARC in terms of content. The bibliographic system(s) that use MEKOF in the Soviet Union would be able to make use of UNIMARC data and likewise systems able to process UNIMARC should be able to process MEKHOF but not without tailor-made conversion schemes for many of the MEKOF fields. Fortunately, for fields that are significantly different than UNIMARC fields in data content, field tags have been chosen which do not correspond to UNIMARC tags, simplifying conversion. The MEKOF record appears to be very similar to the UNIMARC record. A more indepth analysis of the format would require a test tape of the MEKOF records.

3. Character sets - Based on our analysis we are assuming that the character set used in MEKOF to be that defined in the Soviet standard GOST 13052. Actually two graphic character sets are defined in the standard, one for the basic roman and one for the basic Cyrillic alphabets. These two sets have been registered with ISO as ISO 646 and ISO/97/2, respectively. This registration makes them more accessible to likely recipients of records in the MEKOF format and thereby aids international exchange. A boon to use of these records is found in the alignment of the Cyrillic letters vis-a-vis their roman counterparts in the character sets. The one-on-one matching will make romanized display of Soviet records possible when these records are displayed or printed. Unfortunately, the Cyrillic lowercase characters align with the roman uppercase letters which will produce reversed capitalization

unless program conversion specifications are written to compensate. Again, a copy of a MEKOF test tape would reveal more conclusive analysis.

In addition to receiving a Soviet test tape, the Library of Congress would be interested in a discussion of cataloging codes and formats with our Soviet counterparts in an effort to bring us closer to an acceptable standard record. The All Union Book Chamber printed cards are currently used by LC in the acquisition of Soviet materials from our Soviet exchange partners. In addition, selections for purchase are made from the pre-publication bibliography, Novye knigi SSSR. In FY 1987, a total of approximately 2500 items were recommended for procurement using both the All Union printed cards and the bibliography. Thus it would be in our interest to receive records from the Soviet in machine-readable form which could be used with a minimum of modification. We would hope the LC database would also be useful to Soviet librarians. With the present situation, however, it is difficult to see how we could exchange data in any cost beneficial manner.

There are still other standards issues that have not been discussed. An obvious impediment to accepting data from another national agency is the different languages used from country to country. The language used in the MARC records of a national agency naturally is the language of the country, causing difficulties--especially in subject headings and notes--when these records are used by other countries. In those countries where LC subject headings are followed, the English language headings can be translated to the language of interest. This is not a simple undertaking, however, because there is not necessarily a one to one correspondence in terms. Lack of international subject control also presents no small barrier to exchanging data. In the U.S., Library of Congress Subject Headings and LC and Dewey Decimal classification schemes are the classification schemes primarily

followed, while in the Soviet Union, as clearly as we can determine in the absence of a tape of records, the NIR, Nauchno-issledovatel'skaia rabota [Scientific-research work] is used for subject headings and the BBK, Bibliotechno-bibliograficheskaia klassifikatsiia [Library-bibliographical classification] is the classification scheme applied. The resulting mixture requires at least looking into multiple thesauri for subject headings and seeking ways of handling the different classification schemes.

Standardization in how we process and store data has paved the way for libraries to harness advances in technology for the furtherance of resource sharing. The latest of our efforts is LSP or the Linked Systems Project. LSP is the cooperative venture among LC, RLG (Research Libraries Group), and OCLC to link their computers so that the huge files of bibliographic data residing on each system can be shared directly and expeditiously. As the bibliographic utilities emerged in the late 1960s and early 1970s and their databases grew, it became apparent that, along with the LC database, there existed four files housed on disparate systems with no means to share among systems except through LC's distribution of its database via its MARC Distribution Service.

Taking advantage of protocols based on the ISO Open Systems Interconnection (OSI) Reference Model, the LSP partners have developed the Standard Network Interconnection, a communications facility, to forge a national bibliographic network in the U.S. In the LSP environment a member of one utility (e.g., RLIN) could search the data base of one of the others (e.g., OCLC) using the search commands of his own utility or local system. LSP protocols will allow records to be transferred from one system to another online, computer to computer, eliminating the need for tape loading to exchange data. By using LSP links immediate and direct access is gained. Both RLIN and OCLC now receive all their authority records from LC via LSP and no longer tape load such data. They both have also begun sending authority data to LC

electronically in the LSP mode by having selected member institutions of their utilities input authority records to the utilities, which are in turn transferred to LC over the link.

The capabilities of LSP are not limited by national boundaries. What the library community is doing here in the U.S. has implications on the international scene as well. By opting to base our networking architecture on an international standard, OSI, we have left the door open wide for interconnection with other national networks. Illustrative of this possibility is work that is being carried out by the National Library of Canada (NLC) to develop an OSI profile for interlibrary loan (ILL) to effect system-to-system communication of interlibrary loan messages. In ILL development, NLC work has been coordinated closely with U.S. counterparts to guarantee that the NLC developed protocol can be used within the LSP environment. Of further international significance is the discussion between NLC and the British Library Document Supply Centre at Boston Spa, England, to make use of the ILL protocol in an IFLA sponsored pilot project to carry out interlibrary loan activities between these two national libraries.

National and international networks are evolving around the world. With only a little imagination it is easy to envision myriad possibilities for linking to enable and enhance resource sharing on an international scale. Needless to say, adoption of compatible standards is tantamount to achieving such linking.

Consistency

The dictionary definition of consistency is "the condition of holding together ...; agreement with what has already

been done or expressed; conformity with previous practice."[2] No matter in what format the library catalog is compiled, i.e., book, card, or machine-readable, the function of the catalog does not change. It is a finding tool by a variety of access points, e.g., location on the shelf, author, title, subject; and it serves to uniquely identify each person/entity, to collocate the works of each person/entity and the materials on a given subject, to establish bibliographic relationships as appropriate to represent each bibliographic entity only once, and to show what is in the collection. Many of the principal operations of the library--to collect, classify, store and retrieve material are dependent on the quality , i.e., the consistency, of the catalog. Sufficient attention must be paid to the maintenance of a catalog so that the principal access points, names and subjects, are chosen to be consistent with those already in the catalog. The authority record embodies the conventions and mechanisms that provide the consistent nature of the file.

If this does not happen, then it follows that the user of the catalog will only be aware of what he has retrieved but never know what existed in the library which he did not find because the catalog was lacking in consistency. It is this need to maintain consistency within their own catalogs, that makes the members of the bibliographic utilities modify the records found on the utilities prior to including them in their individual catalogs. This modification, albeit far cheaper than performing original cataloging, is still costly.

To achieve this consistency more readily, without costly individual library modification, it follows that the records on the bibliographic utilities (or any other organization which provides bibliographic products and services) should represent

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[2]Webster's New World Dictionary of the American Language, David B. Guralnik, editor in chief, (New York : World Pub. Co., c1970), p. 303.

items which have been cataloged against a single database.

Two projects are underway in the U.S. today toward the achievement of this consistency and which it is hoped, will additionally decrease the costly duplication of cataloging, increase timeliness of the availability of cataloging records, and increase the number of standard records available for shared cataloging.

Since 1977 machine-readable records for authority data have been created by LC and participating libraries to build a national database maintained by LC through its National Coordinated Cataloging Operations (NACO) program. These records are made available to the library community via the MARC Distribution Service and the Linked Systems Project. This past year 50,000 records, or approximately 25 per cent of the name authority records added to the LC authority file, have been contributed by the present 43 participating libraries and the number of participating libraries continues to increase. Maintenance of this database in light of its national level characteristics has been the responsibility of the Library of Congress on many levels, from automation planning to cataloging.

The second project, called the National Coordinated Cataloging Program (NCCP) is designed to increase the availability of national-level bibliographic records by building a database at the Library of Congress of machine-readable records from various sources. This project is presently in a pilot phase and the participating university libraries are Chicago, California at Berkely, Harvard, Illinois, Indiana, Michigan, Texas, and Yale. These institutions follow LC cataloging practices when creating the records. Records will be integrated into one database maintained by the Library of Congress, and will be made available to all subscribers of LC's data. The database therefore is no longer only the catalog of the Library of Congress, but a resource of

consistent bibliographic records that extends far beyond the walls of LC. These other institutions likewise have opened up their databases from being available only to the members of the utility that they belong to or a register of their individual collections to being resource records for a much larger group of libraries.

Since both the NACO autnority records are already, and the NCCP bibliographic records soon will be, available on the bibliographic utilities, to be used for original cataloging as well as shared cataloging; over time, the probability exists for increasing consistency nationwide.

What is the impact on the international scene of building a consistent bibliographic database in a national bibliographic agency? As was stated earlier in this presentation, the research libraries of the world have the need to collect and consequently catalog foreign books. Our national agencies are among these research institutions. If the national imprint of each national agency can be relied upon to be a consistent database as defined, then having this knowledge in the recipient countries assists the libraries in their efforts to amalgamate records from various sources into their databases with minimal adjustments. Knowing that a standard cataloging code has governed the creation of the records and that the principal access points, names and subjects, for each record have been chosen to be the same as those already in the national database, contributes immeasurably to Universal Bibliographic Control.

International Exchange

A recent study[3] indicates that many national

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[3] International Guide to MARC Databases and Services. 2nd rev. ed. (Frankfurt am Main : International MARC Project, Deutsche Bibliothek, 1986).

bibliographic agencies have assumed the responsibility for creating MARC records representing the publishing output of their countries. Nineteen countries reported already having a distribution service underway, while an additional twenty five were identified as being at some stage in the implementation for a distribution or online service. Because of the importance given to the exchange of data, an International MARC Network Committee was established in 1975, made up of representatives from national libraries with MARC programs. This committee is still in existence.

Although data is being generated and distributed worldwide, today the activity is accompanied by a host of problems. The situation can be described as (1) MARC records have become a commodity, and (2) the traditional concept of sharing internationally is eroding. As a result, new issues have surfaced in the machine readable world which contribute to our difficulties of bibliographic control. I recently reported on these issues at another conference and the following extract is from that presentation.

> -Organizations other than national libraries are now aggressively seeking MARC data directly from national bibliographic agencies worldwide, often in direct competition with the national agencies in their respective countries. Coupled with this, many national agencies have assumed the role of a bibliographic utility, further intensifying the contention for receiving, processing, and distributing foreign MARC data. Indicative of the growing concern over this particular issue, the Conference of Directors of National Libraries (CDNL)--an affiliate organization to the International Federation of Library Associations and Institutions (IFLA) and parent organization of the International MARC

Committee--issued the following two resolutions at its 1986 conference in Tokyo: (1) That national bibliographic agencies agree to inform and consult one another before entering into MARC distribution arrangements with other types of organizations, such as bibliographic utilities, to redistribute MARC records in other countries; and (2) That in cases where a national bibliographic agency finds it advantageous to supply an organization other than a national library in another country with its records for redistribution, that this arrangement not be made exclusive.

-Record ownership has become an issue.

-Restricting the use of records beyond the primary recipient has been exacerbated by advanced technology which makes possible electronic transmission of data. It becomes virtually impossible to control unauthorized record use.

-National agencies claiming copyright of their data have imposed restrictions on distribution and redistribution of records, both on wholesale and selective bases. Several agencies now only allow wholesale distribution or redistribution when the records have been converted by the recipient national agency as part of its conversion service for converting records to the format of the recipient country, and, even here, additional limitations are often imposed.

-Some national agencies are being forced to increase the price of their services. They bear the entire cost of creating records, while other organizations

> make money as brokers of the records. Of further concern is the ease of copying MARC records for redistribution, which appreciably reduces the customer base of the national agencies.[4]

We continue to work toward the resolution of these problems--i.e., making it possible to share data but at the same time protecting the economic viability of the creators of the records.

Conclusion

In the U.S. the accomplishments of the past two decades in resource sharing are many in number and noteworthy in substance. The recognition of the importance of standards early on, and the past and continued cooperation in the formulation and adoption of standards, have now provided for the networking activities advancing in this country. Without these standards, there can be no effective networking. Additionally, projects such as NACO and NCCP demonstrate an awareness of the requirement for consistency in catalogs, regardless of form, and the eventual cost benefit to be gained if these projects prove successful.

Unfortunately, internationally we have been less successful. The research libraries of all countries have a great need to collect foreign material in the humanities, sciences and the technology and place the items under bibliographic control for use of their clientele.

It appears to me that in the interest of scholarship and research it would behoove us all to do what we can to continue to move forward with the many programs begun in the IFLA context of

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[4]Henriette D. Avram. "Toward a National Library Network." Journal of Library Administration. 8, no. 3/4 (Fall/Winter, 1987) : 95-116.

building databases that will most effectively serve us all.

The Preservation of Knowledge: Strategies for a Global Society
by

Patricia Battin
President, U.S. Commission on Preservation and Access
Washington, D.C.

General Session IVA
Current Status of Preservation Programs
Thursday, 7 July 1988
13:30—15:00

THE PRESERVATION OF KNOWLEDGE:
STRATEGIES FOR A GLOBAL SOCIETY

Responsiblity for the preservation of knowledge -- the obligation of stewardship for our printed record -- is perhaps the most highly revered tradition of librarianship. And that traditional service today, though long taken for granted by our society, is in great jeopardy because of the frailty of acid paper. The threat of slow fires consuming from within the knowledge of our shared cultures is a topic of equal and immense importance to both our countries, as well as the rest of the world.

Probably every medium we have used to record the creativity of the human spirit, since we moved away from stones, is subject to deterioration. Indeed, it seems that the more sophisticated our technology becomes, the flimsier the medium we employ for storage. In our fast-paced throwaway society today, we too often fall into the trap of devaluing the experience of the past -- of believing that the explosion of new knowledge is happening so fast it makes the wisdom of yesterday irrelevant to tomorrow.

The importance of our cultural heritage to civilized societies was described recently by Dr. Lynne Cheney, Chairman of the National Endowment for the Humanities (a government funded agency dedicated to the support of the humanities in American society). She emphasized the importance of Alfred North Whitehead's concept of a "symbolic code," a shared common knowledge, to the cohesivess of our society. In Dr. Cheney's words: "While that knowledge must reflect the experience of each new generation, it must also be linked to the

tradition that has formed the society...Without this link to the past, we are unmoored, lacking the awareness of where we are and who we are, which is essential to determining what we, as an American community, shall be. As Whitehead put it, 'Those societies which cannot combine reverenve to their symbols with freedom of revision must ultimately decay.'"

The deterioration of acid paper, upon which much of our "symbolic code" has been printed for the past 150 years, presents us with a crisis of historic and international dimensions. And because we now live in a global village, such a crisis demands global attention.

The fragility of acid paper has created both a disaster and an opportunity of monumental proportions.

On the disaster front, we are losing at an alarming rate an enormous portion of our knowledge base -- a crisis probably as difficult for the human mind to comprehend as the losing of half a trillion dollars in a few cataclysmic days on Wall Street. Of the 305 million volumes in American research libraries, we conservatively estimate that 25%, or 78 million, are brittle and turning to dust because of the alum sizing introduced into the paper-making process around 1850. The alum reacts with the moisture in the air to break down the cellulose wood fibers that give paper its structural strength.

The opportunity lies in the potential of the new technologies, including the ease of hard copy publication on demand from digitized text, not

only to afford broader access to knowledge heretofore unevenly available but to utilize new formats in ways that can enhance and facilitate new research directions. In a sense, the prseervation crisis can serve as a laboratory for reaffirming the importance of broad access to the recorded knowledge of our civilization, for assessing the archival properties of the newer storage media, and for linking our traditonal knowledge base to the needs and habits of future scholars in order to protect the symbolic code so essential to a cohesive society. In essence, the preservation challenge forces us to redefine our notion of the research library.

If we view our solution to the preservation problem narrowly only as a "reformatting" operation without regard to the fundamental changes occurring in research and publishing, then we will have failed in our obligations of stewardship. The past will be as lost to the future as if we permitted it to decay. In so many ways, the case of preservation represents a paradigm for the broader set of issues which demand our attention in re-defining the library in a society increasingly dominated by information technology. These issues include effective collaborative efforts, knowledge of disciplinary research methods, choice of format, selection criteria, bibliographic control mechanisms, use of new technologies, copyright implications, network standards, compatibility and access, management of systems of distributed access, the role of the private sector, and new financing strategies.

The primary issue in preservation today, it seems to me, is not the exciting potential of the new technologies -- and it does appear that to date, the excitement is more about potential than affordable reality -- but the

critical need to develop and execute the global strategies to use those technologies productively and in a cost-effective manner to provide enhanced access to the knowledge of the past.

During the past thirty years, the American library profession has compiled an impressive record of achievement in issues related to the conservation and preservation of library materials. These efforts include research on paper chemistry and conservation, the establishment of education and training programs for preservation experts and conservateurs, cooperative filming projects for newspapers and brittle books, the conversion of the National Register of Microfilm Masters into machine-readable format, the development of the on-line capacity to record both the commitment to film and the existence of a master negative, and a self-study survey for the assessment of the preservation needs of individual collections. Reflecting the pluralistic nature of American society, these activities have been carried out by a number of independent organizations and research libraries. The list is too long to recount here, and most of the progress has been recorded in the library literature. A few examples will give you a sense of the wide range of efforts and funding sources:

The Library of Congress has provided valuable leadership to the research library community through its National Preservation Programs Office and three program initiatives: 1) commitment to a major microfilming effort of 750,000 volumes over a ten to twenty year period; 2) extensive investigation of a process for mass deacidifcation of acidic but not yet embrittled volumes; and

3) a pilot project for storing and retrieving journal literature on optical disk.

The National Library of Medicine has outlined a program in cooperation with the network of medical libraries across the nation to microfilm the brittle volumes of journals indexed in **Index Medicus** as well as unique collections of historical materials important to medical research and practice.

The National Agriculture Library is investigating the potential of electronic imaging technologies for the preservation of research materials in the field of aquaculture.

With grants from the Mellon Foundation and the National Endowment for the Humanities, the Columbia University School of Library Service created a pioneering educational program for preservation administrators and technicians. The program has graduated 33 individuals to date, 33 more are completing their studies, and 19 new students have been accepted into the program. The success of this program is reflected in the fact that the number of research libraries with preservation operations has grown from 5 in 1978 to 54 in 1988.

The National Endowment for the Humanities has funded a coordinated, decentralized program for filming United States newspapers.

The Research Libraries Group, a consortium of 36 research institutions, supports, through private foundation and member institution funding, a series

of cooperative microfilming projects to preserve distinctive collections held by the membership.

The American Theological Libraries Association has supported, from member subscriptions, a long-term program to film 400,000 deteriorating manuscripts and books in American theological libraries.

For the past fifteen years, the Association of Research Libraries (ARL) has actively promoted an awareness of the problem and the development of preservation activities in its member libraries through its sponsorship of self-studies, emphasis on the need for education and training programs, and recognition of the need to convert the bibligraphic records of microfilm master negatives into machine-readable form to permit decentralized filming programs without costly duplication.

In 1984, the ARL membership in recognition of the increasingly national and international implications of the preservation challenge and the need for coordinating the broad spectrum of existing activities, passed a resolution urging the Council on Library Resources to establish a national strategy for preservation. For the past thirty years, beginning with the support of the Barrow Laboratory's investigations into paper chemistry, the Council (CLR) has actively supported a wide range of preservation activities. In response to the encouragement from ARL, the Commission on Preservation and Access was established in 1986 on the recommendation of the Committee on Preservation and Access after an eighteen-month study sponsored by the Council on Library Resources. The governing body of the Commission, which is initially funded by

a number of universities and private foundations, includes university officers and librarians. The goal of the Commission is to foster, develop and support systematic and purposeful collaboration among all libraries and allied organizations in order to insure the preservation of the written record in all formats and to provide enhanced access to scholarly information.

It is the intent of the Commission to maintain a small staff and to work through existing organizations wherever possible in order to facilitate and encourage the institutionalization of preservation as a vital component of library and archive operations on a continuing basis. In addition to administrative support, the Commission's program will seek funding of approximately $5,000,000 to $6,000,000 over a five-year period from several sources to support a range of research and demonstration projects, consultants, technical advice, and scholarly expertise necessary for the development of a massive preservation effort with high visibility and widespread societal support. The Commission will promote and encourage efforts to generate approximately $200,000,000 from federal, state, and local governments, universities, and foundations to support the coordinated large-scale production operation necessary to preserve by microfilming or other technologies the contents of as many as three million seriously embrittled volumes.

We believe that the concept of the Commission for Preservation and Access, a small agency dedicated to the development and coordination of a nation-wide program building on the broad range of existing activities of autonomous insitutions is the appropriate strategy for a pluralistic society. We further believe that our strategies for the future must be based on a

series of new recognitions, recognitions which challenge our traditional assumptions underlying research library services:

- That the book is an excellent dissemination format for the user and a fragile storage format for the archival steward;
- That we will need to accommodate both functions for decades to come;
- That enhanced access to knowledge formerly available in geographically distant locations is justification for the federal support of preservation of collections previously financed by public and private universities and research libraries;
- That traditional funding formulas are strained and inadequate to support libraries and services as in the past;
- That the preservation effort represents an opportunity to begin to change the way we provide information services in our society;
- That the redefinition of information services offers an unparalleled opportunity for strategic planning in each institution; there is no longer a "university library" template which says this is how it should be done.

The magnitude of the costs, the vastly increased torrents of published information we must cope with, the changing requirements of scholars, and the constantly changing technical capacities are such that we need a cooperative effort by institutions which have long valued their autonomy. The technology exists to create a national and international infrastructure that will provide cost-effective and efficient means, although in very different ways, for the

storage of and enhanced access to our accumulated knowledge. We must now create the international policies and cooperative structures to exploit that technology.

I would like to emphasize the principle of diversity of approach, of the need to develop a national coordinated effort that permits a great deal of local option. Because of the diversity of need, the technological volatility of our society today, and the constantly changing information requirements as our researchers continue to extend the frontiers of knowledge, our best strategy in conceiving a national plan is to develop

- **a set of basic principles to insure the long life of and broad access to the human record;**
- **a set of accepted standards for format, bibliographic control and retrieval, and for preservation and archival practices;**
- **and a series of options for local institutions in determining the shape and character of the local collection depending upon the institution's academic mission and financial resources.**

The Commission on Preservation and Access has a dual objective:

1) **Establish an international context for a greatly expanded coordinated, collaborative effort to preserve our written record in general and the brittle books problem in particular as a specific initial effort**

AND

2) **Institutionalize the preservation process in local institutions through the establishment of:**

- Disaster programs
- Climate controls
- Training of staff and patrons
- Repairs, binding, conservation techniques
- Survey and knowledge of the collection and procedures for continuing maintenance
- Development of strategies for the shape of the collection in a technological society within the context of a jointly owned "national collection" of master copies in a variety of formats

The Commission's primary objective at present is the establishment of a nation-wide collaborative, large-scale filming program to capture the intellectual contents of brittle books in a new master copy format and to create a central distribution center to provide enhanced access to this new "national collection." To date, microfilm technology is the only stable technology with internationally accepted technical standards for longevity and access. The important point to remember, for those who do not like microfilm, is that the format of storage is not necessarily the format of use. We expect that the developing capacity to digitize microfilm will be affordable and standardized within a few years. However, I would not be at all surprised if photographic technology, rather than electronic technology, will continue to be the format of choice for archival purposes for quite some time. The costs, rate of change, and lack of standards for hardware, software, and networking

capacities necessary for broad access to electronic information may take decades to stabilize.

The **Brittle Books** program has three major components:

- **Convince publishers to change to alkaline paper**
- **Explore the feasibility of deacidification**
- **Capture the intellectual contents of a substantial number of brittle books in an archival master copy format**

The ultimate vision is the existence of a collective knowledge base, in digitized format, from which individual institutions and individual scholars can obtain a variety of formats to serve their scholarly objectives and programs. Initially, this "national collection" could take the form of a centralized depository of microfilms with access through on-line services and efficient twenty-four hour delivery mechanisms with the expectation that storage, access, and service enhancements will evolve with the increasing use of technology by scholars and expanded availability of network capabilities to the research community.

Because we see the preservation of knowledge as a social issue, not one confined to libraries, the Commission's activities will also include the following:

- **Mobilize the higher education community to recognition of the problem and the need for action**
- **Convince publishers to use acid-free paper**

- **Involve the technology coporations in developing cost-effective applications of new and emerging technologies**
- **Develop productive international connections in order to establish a common database of microfilm masters and programs to share filming responsibilities**
- **Support research and demonstration projects to explore the capabilities of the new technologies, reduce preparation and filming costs through automated techniques, and transform our current cottage industry approach to mass production, high volume microfilming facilities**
- **Make preservation a household word and enlist broad grassroots support in a major national effort to save our heritage and reaffirm our belief in unfettered access to information**

At first glance, the prospect of developing a national plan for microfilming millions of volumes in an environment where few institutions are preserving more than 1000 books a year seems to pose an impossible challenge. However, if we assume that of the estimated 78 million brittle books in our nation's libraries, approximately 68 million represent duplicate copies, we have then reduced our problem to 10 million. If we further assume that of those 10 million, approximately 3 million represent an essential core collection to be saved, we have reduced our problem to solvable dimensions. The solution requires a new level of cooperation among public and private universities and research libraries, federal, state and local governments, private foundations, the corporate sector, and individual citizens to combine

forces and funds to preserve 3,000,000 volumes over a twenty year period.

The national strategy would encompass the following basic principles:

1) Twenty large institutions with comprehensive research libraries would commit initially to filming 7500 volumes a year for twenty years for a total of 3,000,000 volumes.

2) The federal government, through the National Endowment for the Humanities, would provide a per-volume subsidy of $60 to cover preparation and filming costs.

3) Participating universities would provide the additional resources necessary through their own budgets and fund-raising from local governments, foundations, corporations and citizens. Support would also be solicited from non-participating institutions that will benefit from the product -- a national collection of 3,000,000 microfilms.

4) Participating institutions, in return for the federal subsidy, would subscribe to the following principles:
   - Use of a simple, standardized on-line capacity to indicate commitment to reformat
   - Use of a simple, standardized on-line capacity to indicate existence of master copy
   - Agreement on technical standards for specific format
   - Agreement on minimal standards for bibliographic control
   - Deposit of master negative and printing master with central distribution facility

5) The Commission would oversee the development of a central distribution facility which would provide rapid retrieval

in a variety of formats -- paper, film, fiche, CD-ROM, magnetic tape, etc. -- for purchase or loan. The facility would be supported by all who need access with customers sharing both overhead costs and transaction fees.

6) A series of disciplinary advisory committees composed of scholars and librarians would be established to review selection criteria and format options.

Although there have been a number of cost studies during the past five years as well as samplings of duplication overlap and inventories of our collections on a national scale, we still lack precise data in many of these areas. We would expect to learn a great deal during the first five years of the project which would shape the directions of the second five years. Although cost estimates from the experience of existing microfilming operations in individual libraries range from $40 to $100 per volume, we believe we can reduce that figure to $60 by establishing cost-effective regional filming facilities, eliminating the traditional but unproductive "bells and whistles" from preparation procedures, and creating improved on-line sources for bibliographic searching to eliminate duplicate filming. In addition, we expect to gather more precise data about the overlap in our collections as well as the gaps in our large comprehensive collections, gaps which might well be filled by specialized collections in smaller institutions.

Because of the National Collection Inventory Project, initiated by the Research Libraries Group and expanded by the Association of Research Libraries,

we have an excellent tool on which to base our initial selection decisions. We would expect to refine those decisions as we proceed with the help of researchers in the specific disciplines. Again, diversity of approach is essential. In some instances, because of disciplinary needs, the book as artifact must be considered although the **Brittle Books** program seeks primarily to preserve the intellectual content. Filming projects currently underway have explored the viability of approaches through 1) subject and chronology; 2) title by title; 3) frequency of use; 4) Great Collections; and 5) identification of genres and exemplars. Because our program will take twenty years to complete, it is important that the format we choose will support the information needs of researchers in the 21st century.

For example, a set of specific problems exist in those disciplines, such as art history, biology, and medicine, where knowledge is contained in both text and image. No satisfactory solution exists today; yet we must agree on a choice among unattractive alternatives before the books disintegrate on our library shelves. This issue and other similar dilemmas are typical of the research and demonstration projects to be pursued by the Commission.

And finally, the options provided by a national collection of preserved materials accessible to all will permit individual libraries to develop strategic plans for the shape and services of the local operation. Dependence upon a shared national collection will alleviate increasingly severe space problems, as the rate of publication continues to grow and the availability of building space shrinks. The consequent "nationalizing" of knowledge will provide the broad, unfettered access to information we see as essential in a

limited locations will now be broadly available across the nation as our universities move toward expanded network capacities for students and faculty. The cost of housing rapidly growing but often infrequently used book collections can be effectively reduced through cooperative support of a national collection and the funds re-allocated to the support of electronic information resources, the strengthening of distinctive, heavily-used local collections and expanded preservation efforts.

Our success in executing this unprecedented national strategy for a global society will require a high degree of leadership and statesmanship from the library profession as we seek to transform our traditional habits and conventional wisdom to conform to our new realities. We must learn to live comfortably with ambiguity, because insistence on setting specific goals in a constantly changing environment will constantly limit our progress.
Over the years, the library profession has developed admirable and enormously productive systems to support international scholarship -- we must now take care that we do not permit those systems, of which we are so justly proud, to strangle our strategies for the future.

Patricia Battin
President
Commission on Preservation
and Access

Library Cooperation: Prospects for International Action
by

Susan K. Martin
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Baltimore, Maryland

General Session III
National and International Issues in Library Networking
Wednesday, 6 July 1988
14:30—16:00

Library Cooperation: Prospects for International Action

Susan K. Martin

Introduction

The topic of library cooperation in general is not easy to deal with, even on a local or national level. International cooperation is considerably more difficult to assess and to carry out, and the varying rates of change among the various cultures of the world make the discussion a complex one indeed. However, the Essen University Symposium in both 1986 and 1987 focussed on international cooperation, and brought together a number of people, each of whom concentrated on a small part of the issue. I commend the proceedings of these two meetings to you, if you are interested in following this session with more detailed reports.

Today I shall briefly outline some major issues and trends in U.S. library networking, and then discuss the status, possibilities, and problems of international cooperation from a North American point of view.

U.S. Library Networks

The decade of the 1970s emphasized the development of computer-based cooperation among U.S. libraries. OCLC became successful, and librarians with much vision and few resources

joined in to build the vast network that is now international in scope. Some regional networks were established; others already existed, and changed their focus to provide OCLC services to their members. In retrospect, the phenomenon of the bibliographic utility to provide cataloging records for libraries swept across the nation in an incredibly short span of time. By the end of the 1970s, OCLC's ongoing growth in terms of new users had dwindled to a trickle, but it had thousands of libraries as customers.

That situation has changed dramatically since the early 1980s. With the more conservative political and economic climate of the country, librarians have now shifted from the enthusiasm for total cooperation to a strong support of local systems with a more cautious embrace of the cooperative. Several factors enter this picture: (1) microcomputers make it possible for libraries to accomplish locally what once could be achieved only by cooperating with others; (2) librarians have discovered that the autonomy of a local system is often more attractive than the requirements of operating according to network procedures; and (3) the private sector, or business entrepreneurs, has discovered the library market to be profitable and is offering services that may compete with network services.

Bibliographic Utilities

Nevertheless, most large and medium-sized libraries in the U.S. and Canada are members of a network and use some

bibliographic utility (primarily OCLC) at least for cataloging and interlibrary loan. The question of "whether" to join is no longer an issue; instead, the questions of "how," "how standard," and "how to interface" are now paramount -- questions that have not yet been completely resolved even within the U.S. Critical to the success of automated library cooperation has been the development and widespread acceptance of bibliographic and technical standards. The MARC format, AACR2, and now the development of the Linked Systems Protocol (LSP) are essential to our current activities, but throughout the country there are significant departures from established standards which make cooperation less easy. The example that comes to mind most readily is that, while there is a MARC format, each computer system has its own "MARC format," and communication among systems therefore requires that each participant know the idiosyncrasies of the other's variant. That is, OCLC has an "OCLC MARC" format, RLG an "RLIN MARC" format, etc. These variants are not very dissimilar from US MARC, but the differences are critical for cooperation and exchange of data -- the whole point of having a MARC format.

In addition to the development of computerized catalogs to be shared among libraries, areas of cooperation include formalized interlibrary lending and borrowing procedures, reciprocal borrowing privileges, coordinated acquisitions policies, and cooperative preservation programs. The success of these programs is varied and depends very much upon the

librarians' perceived need for cooperation. This perception varies from one person to another, and indeed from one occasion to another within the same individual.

The Private Sector

In recent years, the number of private businesses which support library automation has increased significantly. After the recognition by large companies like IBM that they were not interested in the small library marketplace, aspiring entrepreneurs formed small firms dedicated entirely to the library and information market, and took advantage of the movement of technology to smaller and more affordable hardware.

Increasingly, the private sector is able to persuade librarians that commercial products present reasonable alternatives to joining a network which uses a bibliographic utility. In the areas of cataloging and information retrieval in particular, the private sector offers to librarians opportunities that have never before been available. Local online systems are increasingly available, not only for the large affluent libraries but also for smaller institutions. In addition, the private sector is creating and offering products which compete with the networks and utilities, and they are able to offer very attractive prices because they focus on general needs. Good examples are firms which provide a large subset of the LC/MARC data base on CD-ROM, together with cataloging and circulation software. This type of system can be much less expensive than

using a nationwide network, and is fully within local control.

But in at least one important way, the local systems of today are unlike the batch punched-card systems of the 1960s and early 1970s: the local systems cost much more than the batch systems and therefore are often compared by the library to the costs of networking, which can also be significant. Library administrators are beginning to weigh the costs and benefits of belonging to networks and using bibliographic utilities, against investing in a local system and using commercial products. If an integrated local system is judged to be not only necessary but also of higher value than cooperation, then cooperation may become a lower priority.

If all a library needs is to acquire bibliographic data, cooperation with others may not be a high priority. Particularly in smaller libraries, LC/MARC records from any source are likely to fulfill that particular need. Why, then, join a network? The LC records are available from the private sector, and of course they can be purchased from LC itself at a very low price. What is missing if one does not join a network? Interlibrary loan, among other things. One could surmise that it is essential to retain networks because they present the only mechanism we have for communicating holdings information and ILL requests. I suggest that this reason alone is not sufficient; we may need to retain a bibliographic data base with holdings information -- an online national union catalog -- but we may not need the existing governing structures, including regional networks, to do so.

I do not mean to imply that there is a wholesale movement away from networks, utilities, and cooperation. On the contrary. Libraries have changed their procedures so completely during the past twenty years to accommodate these cooperative efforts, that it is difficult to justify a move away from this investment. Nonetheless, the strength of local technologies, local systems, and the desire for local control have weakened the grip of what was once considered to be the ideal -- a physical national bibliographic network. Instead, the U.S., like West Germany, seems to have reconciled itself to a logical national network, using the Linked Systems Protocols.

The profession is now recognizing that the desirability of a centralized system lies only in the support of the union data base and interlibrary loan. Years ago we thought that acquisitions, circulation, and even serials check-in might be done on a centralized system. It is clear that we are now refining the true value of centralization; as needed network functions decrease in number, we must of necessity ask ourselves if the cost can be justified.

Status of International Cooperation

My current thinking is that the status of international cooperation depends in large part upon the potential participant. Some believe that international cooperation does not exist, while others believe that much activity of a positive nature is occurring.

A recent survey of ARL libraries indicates that almost all institutions borrow and lend internationally.[1] International transactions are viewed as a last resort, for a variety of reasons having to do with problems which do not exist for domestic transactions. The implementation of computerized bibliographic data bases in other parts of the world is seen as an improvement for ILL operations, and to the extent that OCLC and RLIN are used in the United Kingdom and Europe, the international borrowing problem is already beginning to diminish.

Among North American research libraries, the rate of interlibrary lending and borrowing is heaviest with six or seven countries: the United Kingdom, France, West Germany, the Soviet Union, Japan, Italy and Australia, although lesser traffic occurs with many other countries. Among the problems encountered by interlibrary loan librarians are: (1) erroneous citations; (2) inadequate abbreviations; (3) requests for material not owned; and (4) lack of a return address on the request form or letter.[2]

Mak has concluded that the most serious obstacles encountered by librarians attempting to share resources internationally are bibliographic access and cost.[3] With increased access to data bases such as OCLC, RLIN, and European files, the former problem is gradually becoming less severe, although many years will be required to resolve the problem internationally. The issue of cost is more complex: the exchange rates, the very slow processing of payments for copies, the lopsided prices for copying in different countries, and differing

copyright laws all combine to make life difficult for the interlibrary loan librarian trying to carry out what should be a relatively simple procedure.

In fact, a proposed European Bibliographic Data System has come under fire well before its inception, because of the "conflict" posed by the existing capabilities of both OCLC and the British Library.[4] And spokesmen for the Bibliotheque Nationale have talked about the need to use OCLC, but then to "Frenchify" the resulting data base to be most useful to librarians in France.[5] A single country's data base would once more separate the international union catalog, making it more difficult to find material and to communicate among countries.

In fact, particularly the national or unviersity libraries in many countries are already using OCLC, or at least evaluating it for their purposes. More impressive, though, is the number of international networks for scientists and scholars.[6] Because of the ease of communicating via electronic mail or other computerized system, the trail of information use has now left the libraries and found its way onto individual desks, where scholars communicate directly with their colleagues in other countries, using standardized communications protocols. A good example of this kind of network is EARN (European Academic Research Network), which includes direct access by users in Europe, the Middle East, the U.S., Canada, Japan, Southeast Asia, and Australia. IBM protocols are used, and emulation software is employed by those computer centers not owning IBM hardware.

In those countries which have a higher degree of centralization, the establishment and use of such networks is easier than in countries in which there is a great deal of local autonomy. Whenever a government can initiate and propound a network, the network seems to survive and thrive in that country; at the same time, the government often views interaction with other nations as a positive benefit of the network, and stimulates international networking.

Issues for International Library Networking

Several issues stand out prominently in discussions of actions toward international networking. Very few of these can be directly related to government action; most are dependent on resources, people, or economics and social progress.

1. Standards

Foremost among the concerns of those involved in developments regarding international networking is the question of standards. Both bibliographic and technical standards need to be adopted widely. Hildreth believes that we have passed the stage of forming standards within a research and development environment, and are in danger of allowing market-driven development of standards to take over, causing proliferation of proprietary systems.[7] Some difficulty exists in determining technical standards, despite the fact that the OSI standard is being worked on by the International Standards Organization. The U.S. is

behind much of the rest of the world, which has adopted OSI at least at the governmental level. Within the U.S., the TCP/IP protocol is still widely used, although large system operators indicate that they will move to OSI in the future. In countries such as the Federal Republic of Germany, in contrast, all decisions regarding technical standards have been made for libraries by the government, and there is no option or flexibility.

2. Attitudes

Another area which is causes problems in network management, whether national or international, concerns human behavior and attitudes. Goodman and Standera have said that technical obstacles can be conquered, but those involving human interactions will remain relatively intractable.[8] In some countries, networks seem to fail because governments do not subsidize the full cost; in the U.S., on the contrary, librarians wanted to cooperate to use the OCLC system, and found a way to do so. It is clear that even more than local or national networking, international networking must be built on a consensus, and one that is not easy to achieve. The strengthening role of vendors is potentially debilitating to cooperative efforts, as the private sector is able to offer more and less expensive systems to suit the local needs. Autonomy, and the desire for control over one's own destiny, is such a strong force

that even a national system can be sabotaged by local systems which go their own way.

3. Resources

The capacity to create an international network is very dependent upon the resources available in each country, for individual libraries, to accommodate the costs of an expensive technology. In most countries, both librarians and politicians must be persuaded that networking is good and necessary. The politicians are needed to provide the resources that the libraries inevitably do not possess. The resulting requirement is an environment that brings together a positive attitude on the part of librarians, with a good political sense on their parts, in order to show the politicans that networking on an international basis will be a positive force in their country. The European countries, particularly with the Council of Europe and the OECD, seem to be overcoming the barrier to the political structure. Such is certainly not the case in the U.S.

4. Privacy

The issue of privacy is of great concern in many countries. Several European countries and the Council of Europe have issued policies which guarantee to individuals the right of privacy in an age dominated by information technologies which could, if ill-used, do damage to

confidentiality of records of citizens and residents of the country. Several European countries and Japan have such policies; once again, the U.S. unfortunately has taken no significant steps in this direction. To truly cooperate internationally, it seems that consistent policies in an area of such sensitivity are essential.

Conclusion

It is obvious that information technologies have taken libraries far in cooperating, particularly within the boundaries of a single country. Among the first to use computers, librarians are now beginning to fall behind the remainder of the world in such use. A true effort to use existing channels of international communication to share resources and extend the bibliographic capacities of each of our libraries is not only possible, but also highly desirable for the scholars and readers of the future.

1. Collette Mak, "Planning for international interlibrary loans" in International Library Cooperation; 10th Anniversary Essen Symposium. Ed. by Ahmed H. Helal and Joachim W. Weiss. (Essen: Universitatsbibliothek Essen, 1988)

2. Ibid., p.246.

3. Ibid., p. 253.

4. Bernard Gallivan, "A European bibliographic database centre" in Impact of New Information Technology on International Library Cooperation, ed. by Ahmed H. Helal and Joachim W. Weiss. (Essen: Universitatsbibliothek Essen, 1987).

5. "Le Plan Catalogue" Research Libraries in OCLC: A Quarterly: no.25 (Winter 1988) p.3-12.

6. David I. Raitt, "Communications channels and networks: facilitating information transfer and exchange" in International Library Cooperation, ed. by Ahmed H. Helal and Joachim W. Weiss. (Essen: Universitatsbibliothek Essen, 1988).

7. Charles R. Hildreth, "The U.S. National Standard Command Language for online interactive information retrieval: a status report" in Impact of New Information Technology on International Coperation, ed. by Ahmed H. Helal and Joachum W. Weiss (Essen: Universitatsbibliothek Essen, 1987)

8. H.J.Abraham Goodman and Oldrich Standera, "Problems, issues, and prospects in the international electronic exchange of alpha-numeric, pictorial, and graphic educational information resources" in Impact of New Technology on International Library Cooperation, ed. by Ahmed H. Helal and Joachim W. Weiss (Essen: Universitatsbibliothek Essen, 1987)

Regional Conservation Centers in the United States
by

Ann Russell
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General Session IVB
Regional and State Conservation Centers
Friday, 8 July 1988
9:00—10:30

REGIONAL CONSERVATION CENTERS IN THE UNITED STATES

BY ANN RUSSELL

United States does not have a central conservation facility to meet the needs of libraries, nor does it have a national conservation policy. The strength of the preservation movement in this country lies in strong institutional programs. A handful of libraries that have hired preservation administrators and developed model preservation programs provide leadership to the entire library community. One thinks, for example, of Yale University, the University of California at Berkeley, or the New York Public Library. And yet we cherish the idea that the preservation activities of individual institutions should take place in the context of national and regional planning and coordination.

As libraries realize that they can no longer turn away from their preservation responsibilities, they have recognized the need for establishing regional conservation centers to meet the needs of the hundreds of smaller libraries that cannot

afford to build in-house conservation laboratories or to hire conservation staff of their own. The purpose of regional conservation centers is to make conservation facilities available on a cooperative basis to a number of institutions in a region. Regional centers enable several institutions to share the cost of conservators' salaries and to avoid wasteful duplication of equipment. They also give institutions access to a higher level of conservation services than they would be able to afford individually.

The goal of a center is to be self-supporting through fees for its services. The model for regional conservation centers in this country came from the museum field. The development of centers specializing in the treatment of fine arts objects was encouraged in the 1970's by the National Endowment for the Arts, which provided seed money to establish approximately ten centers around the country.

The Northeast Document Conservation Center, in Andover, Massachusetts, of which I am the Director, was the first regional conservation center established to address the specific needs of libraries collections. Founded in 1973, its services are available to all non-profit institutions in an eight state region in the northeastern part of the United States. Each year, more than 400 different institutions bring materials to our center for treatment or microfilming.

The original function of our Center was to perform conservation treatment of books and documents to assure that they could be handled and read by researchers, present and future. Most frequently we are called on to perform basic stablization of materials at the lowest cost; however, sometimes our work includes improving the appearance of an object for exhibition or photography. Because of the high cost, this type of intensive treatment tends to be suitable only for the most rare and valuable artifacts in a collection.

information about the value of the object to the collection, the way it will be used, and how it will be stored. The conservator provides input on the condition of the object, the recommended steps of treatment, the treatment options and their costs, and the risks involved, if any. Ultimately, it is the librarian who decides what is to be treated, because it is the library that must pay the bills.

In the late 1970's, NEDCC added a preservation microfilming service to its program, recognizing that microfilm is a cost effective preservation method for saving information when conservation of the original is not practical. The microfilming service has enabled NEDCC to preserve many important collections of manuscripts as well as to participate in the brittle books microfilming project of the Research Libraries Group.

In 1980, with the help of a grant from the National Endowment for the Humanities, our Center established a field service office for the purpose of providing technical advice on preservation to

libraries and other repositories. The primary activity is performing on-site surveys of preservation needs. The field service director inspects the library building from the roof to the basement, looking at the way in which collections are stored and making recommendations for improvements. She examines the environmental conditions, the security issues, and the housing and handling of collections. Following the site visit she produces a written report summarizing recommendations.

These surveys have been remarkedly effective in bringing about improvements in conditions, even where existing conditions were appalling. Because we are perceived as experts from out of town, our recommendations provide reenforcement for the library staff, enabling them to gain support from their administrations for preservation measures. Other activities of the field service office include presenting workshops and seminars, providing informal consultation, teaching courses at library schools, and providing disaster assistance. The field service functions of our

Center, unlike the laboratory services, cannot be operated on a cost-recovering basis. The need for our Center to subsidize these activities, through grants from outside sources and ultimately through an endowment, has serious implications for our financial planning.

NEDCC is proud that it is providing a valued service to its own region. But unfortunately vast areas of the country are still without conservation facilities, including the Mountain States, the West, and the Midwest. Getting a new conservation center off the ground is no easy matter. Substantial start up monies must be raised. Recruiting qualified personnel to staff a new center can be a problem because of the shortage of experienced conservators and administrators.

It is difficult for a center to obtain commitments from its clients to use the center's services on a regular basis. The institutions served by a center are far from affluent, and they are not in the

habit of budgeting annually for conservation. Consequently the center's work load is characterized by peaks and valleys. It takes time and effort to put a new center on a firm financial foundation. Regional centers try to operate their laboratories like businesses. But the practice of conservation is not necessarily susceptable to factory methods of production.

In 1985, in an effort to encourage cooperation in preservation in other regions, NEDCC, as the oldest of the Centers, organized a conference for regional preservation programs in all parts of the country. The meeting was supported by a grant from the National Endowment for the Humanities. The purposes were to share audiovisual materials and handouts, to exchange information, to build networks, and to have a voice in national planning efforts. The group continues to meet on an annual basis, and the spirit of cooperation is strong.

Clearly there remains a need to provide greater support for regional conservation centers where

they exist and to establish new ones in under-served areas. The federal government has a role to play in developing this infrastructure. But support must come from other sources as well, including state agencies, private foundations and corporations. There must also be increased commitment on the part of the individual institutions that make use of the center's services. Within the past year, there has been growing recognition that the brittle paper problem is a national emergency. I am optimistic that increased public concern will stimulate greater support on all levels.

New York State Program for Conservation and Preservation of Library Research Materials by

Joseph F. Shubert
State Librarian and Assistant Commissioner for Libraries
The New York State Library
Albany, New York

General Session IVB
Regional and State Conservation Centers
Friday, 8 July 1988
9:00—10:30

THE NEW YORK STATE PROGRAM FOR CONSERVATION AND PRESERVATION OF LIBRARY RESEARCH MATERIALS

-- Joseph F. Shubert, State Librarian and Assistant Commissioner for Libraries, New York State Library, State Education Department, Albany

The New York State Library, established in 1818, has faced preservation crises over its 170 years, including those resulting from poor housing of its collections in inadequate space and a disastrous fire. Space was a problem as early as the 1840's (resulting in construction of a building to house its collections in 1854) and in the 1890's and again in the 1960's. In 1911, the Library's book and journal collections were destroyed by fire but, fortunately, manuscripts and papers escaped.[1] Today's crisis in preservation lies largely in the steady deterioration of collections because of acidic paper.

Similar preservation problems are faced by other major research libraries, and in 1982 the heads of eleven research libraries[2] and I met over a period of months to develop legislation which would provide funds to help these, and other, libraries move quickly in addressing the preservation problem. I will describe the program that resulted from those meetings. Before doing so, it is useful to see the role of the New York State Library in relation to other libraries in the State and to the preservation problems faced by libraries in the State.

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[1]Roseberry, Cecil R. For the Government and People of this State, a History of the New York State Library. State Education Department, 1970.

[2]Columbia University, Cornell University, the Research Libraries of The New York Public Library, New York University, New York State Library, Syracuse University, the University of Rochester, and the State University of New York Centers at Albany, Binghamton, Buffalo, and Stony Brook.

Role of the New York State Library

The New York State Library, which is part of the State Education Department, has two major divisions: a research library and a division of library development. The research library has a collection of more than two million volumes and millions of microforms, newspapers, maps, manuscripts, and other documents. It is the largest of the 50 state libraries in the nation, and has pioneered the use of technology so that today its online catalog is available in 211 legislative offices and various medical, library system, and other libraries across the state.

The library development division works with some 7,000 libraries throughout the State to achieve our goal that every resident of New York State should enjoy timely and free access, through local libraries working within library systems, to a full range of information resources and service, provided without restriction of censorship or violation of privacy. The Division administers state and federal aid for libraries, oversees public libraries, and advises and assists libraries of all types (public, academic, school, hospital, corporate, and special). Most of the assistance is provided through systems of libraries which are in large part supported by the State and through grants for particular objectives or services. Since 1984 one of the grant programs is for the conservation and preservation of research materials.

The 1984 and 1986 Legislation

In 1983 we proposed that the State each year provide funds for four purposes: (1) basic grants of $90,000 annually to the eleven designated comprehensive research libraries; (2) $1 million annually for these libraries for collective action in preserving materials; (3) $1 million for grants to other libraries and depositories, regardless of size or location, for preservation of endangered unique research resources; and (4) an office in the Division of Library Development to "identify the conservation and preservation needs of libraries within the state, to assess the technology available for such conservation and preservation, and to coordinate the conservation and preservation efforts...."[3]

The law was enacted, without full funding, in 1984 and additional funding was approved in 1986. We currently have $1.8 million annually for the program and are seeking to increase the funds to $3 million annually.

Funds for the office require annual appropriations as part of the Education Department operating expense. These funds have been too limited to accomplish the program objectives, and the National Endowment for the Humanities and the Mellon Foundation have granted funds to strengthen the education and technical assistance services of the office.

Program Accomplishments

Since 1984, we have granted $5.5 million for preservation in the eleven comprehensive research libraries and $1.7 for all other

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[3]New York State Education Law, Chapter 273a.

libraries. We have an education program that encourages preservation planning at the institutional level, disaster preparedness, and public awareness of preservation needs.

As a result of this program, each comprehensive research library has prepared a five-year plan for preservation. Most have reorganized or created preservation offices. The total number of staff engaged in preservation activities has increased from 83 to 203. Total preservation expenditures increased 47 percent, between 1984 and 1986 (from $4.6 million to $6.8 million). Important collections and materials have been preserved through microfilming and conservation treatment.

Most of the grant funds in the eleven libraries have been expended for physical treatment (41 percent), preservation microfilming (20 percent), identifying and screening materials for preservation (11 percent), and such other projects as environmental controls, disaster preparedness, and staff and user education (28 percent).

Recorded as well as print and manuscript material has been preserved. For instance, the Library of Natural Sounds at Cornell University has copied onto new tape almost 3,000 recordings representing 144 hours of recorded material, including African bird calls, meetings and speeches of the American Labor Party and over 30 years of broadcasts by New York City's municipal radio station.

This year seven of the research libraries are beginning an effort to preserve 2,100 New York historic transportation and city street maps. The preserved maps will be fully cataloged in OCLC and RLIN and the project will publish a checklist of them.

In the discretionary grant program aiding "all other libraries" we have authorized 116 projects at 78 libraries, archives, historical society, museums, and other institutions. These grants have enabled institutions to improve environmental conditions, microfilm deteriorating materials, preserve early sound recordings, and treat maps, photographs, posters, manuscripts and other materials.

Materials preserved have included pre-revolutionary land company records, photographs from North Pacific expeditions from 1897 to 1903 which the trace relations between the early inhabitants of America and Asia, Eugene O'Neill manuscripts, and a collection of Yiddish children's literature. A grant helped in the preservation of the 1850-1950 archives of the Steinway piano factory, materials which uniquely document the history of American immigration and unionization.

Grant recipients have entered bibliographic information on all preserved materials into a national database, assuring that other libraries and scholars know of the availability of the materials preserved. We require public access to preserved materials.

Experience in the program is proving useful in development of standards. For instance, as a result of the grants, Cornell University and three other libraries formed a consortium that has fostered further emphasis on preservation standards for recorded sound. A grant assisted The Rochester Institute of Technology develop a test to show the relative resistance of microfilms to attack by atmospheric oxidants.- The test method has proved reproducible and several photographic manufacturing companies will use it to improve microfilm technology.

Other Developments

Library preservation emerged throughout a report and discussion at May 1986 conference on "Our Memory at Risk; Preserving New York's Unique Research Resources."[4] The conference was the culmination of a 1982-1983 New York Document Conservation Administration Training and Planning Program conducted by the New York State Library Archives and the State Library with the help of a grant from the National Endowment for the Humanities. The program focussed on preservation needs for historical records and unique research materials.

Four other states (Illinois, Maine, New Hampshire, and New Jersey) have established programs roughly based upon the New York model. The grants from the National Endowment for the Humanities and the Mellon Foundation are intended to produce experience and materials useful to other states. In April 1988 we produced a one-hour teleconference, "Fighting Slow Fires," broadcast throughout the State by nine television stations. Some 50,000 persons are estimated to have watched the program, and more than 40 people from throughout the State telephoned questions to the panelists during the course of the hour.

Grant funds helped Columbia University Libraries produce a 15-minute videotape which can be used by libraries and schools to train staff and users in the proper handling of books.

In cooperation with the Northeast Document Conservation Center and

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[4]Our Memory at Risk, Preserving New York's Unique Research Resources, a Report and Recommendations to the Citizens of New York by the New York Document Conservation Advisory Council. [New York State Education Department, Albany] 1988.

library systems, we have begun a series of disaster preparedness workshops and will produce a disaster planning guidebook.

Observations on the Program

The program has been remarkably successful in:

(1) aiding those libraries in which preservation has been a priority of the administration and adequate planning has been underway;

(2) encouraging library administrators to initiate preservation programs and re-examine their preservation priorities;

(3) providing a stable base for the preservation program in several of the comprehensive research libraries when retrenchment threatened all programs;

(4) focusing attention on preservation needs, and producing information useful to librarians and the public; and

(5) providing instruction needed by small institutions which have deteriorating materials and are interested in applying for grants.

Experience also has shown that:

(6) A program of this magnitude requires more administrative and technical staff than most administrators foresee.

(7) Many people looking for technological magic in conservation need to think first about such simple steps as better staff and user education programs, correcting environmental deficiencies, and developing clear collection policies.

(8) The public is genuinely concerned about the specter of losing a large part of our cultural and intellectual heritage.

(9) It is difficult to quantify and cost out preservation needs at the

State level because of imprecise information about collections, the condition of holdings, duplication of holdings, unpredictability of future use patterns, and because of the cost of obtaining analysis of such data.

(10) Cooperative efforts in preservation projects require more time and compromise than some administrators believe worthwhile.

(11) The bibliographic networks are an effective means of avoiding inadvertent duplication of effort.

(12) Preservation problems don't stop at state or national boundaries. What we preserve is important to libraries far beyond New York State; what those libraries preserve and how they do it is important to us; and the prospect of an expanded Federal commitment through the National Endowment for the Humanities and the Technical Library Services and Construction Act is encouraging libraries.

Four years of experience with the program shows that a coordinated approach to preservation, in which institutional, state aid, Federal, foundation, and other funds are integrated is an important part of assuring access by scholars of today and the future.

Microforms and Brittle Books
by

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General Session IVC
Microforms and Brittle Books
Friday, 8 July 1988
10:45—12:00

MICROFORMS AND BRITTLE BOOKS

"Microforms and Brittle Books" is a very broad topic. I have chosen to describe two models for cooperative microfilming programs in this country, and, in light of my experience with these programs, to present some observations concerning questions that should be considered as part of planning for possible future international cooperative preservation microfilming efforts.

Before describing specific programs, however, it would seem useful to spend a few minutes on the question of why American libraries choose microfilm as the primary means of preserving deteriorating collections. The majority of bound materials in American research libraries are considered to be valuable for their intellectual content only. Since there are literally millions of brittle volumes in our collections, it is simply too expensive and time-consuming to preserve them in their original format. The best that can be done is to capture the information they contain in some alternate format and to reserve costly conservation treatment for rare and special materials that have value as artifacts.

Among the reasons that microfilm remains the preservation format of choice for most printed materials is the fact that national standards exist for film production, testing, and storage so that consistency in quality can be achieved. Equally important is the fact that testing has shown that silver halide microfilm that has been properly produced and stored will

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last hundreds of years. Furthermore, copies can be made and distributed relatively easily and inexpensively and retrieval equipment is affordable and simple to operate. While it remains true that retrieval is relatively slow, that microfilm is not suited to all materials, and that it is unpopular with some library users, no alternative exists at this time that offers its advantages as a preservation medium. In fact, most scholars will admit that they are glad microfilm exists because it provides access to information that would otherwise not be available. Considering how much information in the world today is at risk of being lost, we cannot afford to wait until another format that is more acceptable to the public becomes an affordable option for libraries. Nor can we afford to invest millions of dollars in a newer technology until we have gained the same level of confidence in its usefulness than microfilm affords.

Our vision of the future, as described by Patricia Battin in an earlier paper, is in fact that of a shared data base of preserved information in digitized format. Among the many advantages offered by optical disk, for example, are its extreme density of storage, resistance to physical damage, and capability for image enhancement. Another very important factor is the greatly improved access that it provides since text can be linked to bibliographic citations and retrieved simultaneously by multiple users at remote sites. The recent announcement of the availability of optical disks capable of lasting one hundred years or more and wider recognition of the fact that digitized data can be regenerated when the images begin to degrade are beginning to allay concerns about the longevity of information

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that is stored in this manner. Despite these developments, the current need for more work on standardizing formats, scanning procedures, hardware, and software, as well as the unknowns related to costs and distribution systems for information preserved in digitized form have convinced most people in the field that microfilm will remain the preservation format of choice for some time to come. The fact that information captured on microfilm can later be transferred to digitized form helps weaken the argument that the choice of such an older technology is a backward-looking and unimaginative preservation strategy. American libraries will continue to encourage research in these new technologies and to monitor new developments in the hope that they will become sufficiently standardized and affordable that they can soon be incorporated into existing preservation programs. It seems likely, however, at least for the forseeable future, that electronic imaging systems will be used for high demand materials or those that cannot be reproduced adequately on microfilm and that microfilm will continue to be the format chosen to preserve little used materials in selected disciplines.

It is because of this need for more research and testing of the newer technologies that microfilm was the format chosen by the Research Libraries Group when it began its first cooperative preservation project in 1981. With funding from the National Endowment for the Humanities and the Andrew W. Mellon Foundation, Research Libraries Group member libraries have been able to film approximately 45,000 brittle volumes during the first two phases of the project. While it is certainly not the only cooperative

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effort of its kind in the United States, the RLG project presents a useful model for discussion because of the kinds of issues that needed to be addressed and the procedures that neededed to be established before such a large-scale effort could be conducted successfully.

The first question, of course, was how the materials to be filmed would be selected. It was decided that the period of the most brittle paper in member library collections (1870 - 1920) was a good place to begin. The initial phase of the project concentrated on monographs published in the United States and books about the United states published elsewhere. Within those guidelines, a number of Research Libraries Group libraries developed proposals to film in subject areas of particular strength in their collections. In some cases, where potential overlap existed, an individual library's choice of subject had to be renegotiated. The proposal for the project was written by RLG staff and carefully reviewed by subject specialists and preservation librarians before it was approved for funding by the granting agencies.

Phase II of the project concentrated on American serials from the same brittle paper period. Planning for the third phase of the project involved closer collaboration with collection development specialists in RLG libraries and resulted in a somewhat different approach to the selection of materials to be preserved. Rather than limiting filming to certain time periods or countries of publication, Phase III - known as the "Great Collections Project" - will involve the filming of some of the most

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distinctive subject collections held by major American research libraries. While this will not guarantee that all of the important literature in a particular discipline will be preserved, it will provide some assurance that at least many of the brittle volumes in that subject will be available for future research.

The Research Libraries Group experience with different ways of selecting materials to be preserved and with deciding which libraries should assume responsibility for different portions of the literature should be of interest to others planning cooperative filming programs. Even more valuable, however, was the experience gained by participating libraries in working toward establishing common procedures and arriving at consensus regarding methods of ensuring consistent film quality. After many meetings and much hard work, the Phase I project group was able to develop a detailed set of procedures for preparing materials, specifications for film production and storage, and guidelines for quality control. This task probably posed the greatest challenge in the early days of the RLG cooperative microfilming program. Because most of the seven institutions in the first phase of the project already had filming programs in place and used procedures that differed from each other and from those proposed for the project, arriving at consensus and implementing the necessary changes at the local level were not easily accomplished. Changes occurred, for example, in the type of film used, the number and kind of splices allowed, the information to be provided in film targets, the frequency with which film was to be tested for residual chemicals, and the thoroughness of the inspection given finished film. At least to some extent, staff in every

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library had to be retrained. While the experience was sometimes painful, the introduction of these new procedures was essential if consistently high quality film was to be produced.

Another initial difficulty involved changes in local cataloging routines. From the beginning, prompt inputting into the Research Libraries Group data base, RLIN, of bibliographic records for titles preserved as part of the project was considered essential if duplication of filming effort was to be avoided. This meant that a much higher priority had to established for the cataloging of microforms in participating libraries. Furthermore, changes were made to RLIN to enable institutions to indicate their decision to film a title as well as later to record the existence of a finished film. This new emphasis on the importance of bibliographic control of microfilms was a major change for staff at participating libraries.

The project was administered by the Research Libraries Group's central office. While it was not always easy for the libraries involved to agree to give up some of their autonomy in matters such as ownership and storage of master negative films, managing project funds, determining priorities, and setting productivity goals and deadlines, in time most began to recognize that adopting the new specifications and procedures in fact meant a substantial improvement in local operations and that centralized coordination of the project meant much less administrative work. All recognized that by working together, they were able collectively to

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preserve many more titles than any one of them could have hoped to accomplish on its own.

The importance of the Research Libraries Group project to other institutions is the evidence it provides that cooperative projects can work well. Aside from performing the valuable service of standardizing and upgrading local preservation procedures, it has served as a model for other projects. As libraries begin to consider the need for international cooperation, the lessons learned from the RLG experience should prove to be very useful.

A second model for consideration is that of the National Library of Medicine. After a comprehensive preservation self-study which was conducted in 1984/85, the Library began an ambitious project to microfilm all of the brittle serials and monographs in its collections. Over a four or five year period, 100,000 volumes will be filmed. Records for what is being filmed are being made available to medical libraries everywhere through the NLM Medline files and access to the information that is being preserved will be provided through interlibrary loan. Within copyright restrictions, copies of the film will be made for other libraries as replacements for their deteriorated holdings.

Preservation of the biomedical literature is a critical part of the National Library of Medicine's mandate. For this reason the Library's

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preservation policy includes the statement that "While the preservation of NLM's own collection is a major step toward the preservation of the entire scholarly biomedical record, NLM also has a responsibility to assist the preservation of important biomedical literature held by other U.S, institutions". As a result, the Library has recently issued its "National Preservation Plan for the Biomedical Literature". In addition to providing preservation education materials, training, and reference services, and continuing to conduct research into newer preservation technologies, the Library plans to offer cost-sharing grants for the conservation or microfilming of important biomedical materials that are not held by NLM. Proposals will be reviewed by a panel of medical historians and librarians to ensure that the materials are of sufficient importance to warrant expenditure of limited preservation funds. NLM staff will coordinate the filming projects to eliminate duplication of effort and to ensure that preservation standards for preparation of materials, film production, inspection, and storage are met.

Regardless of whether they engage in NLM-funded microfilming projects, an important way that many medical libraries will participate in the national program is by lending volumes that are missing from NLM or other collections and needed for filming. If titles are to be filmed only once, and all medical libraries are to depend on that film for future access to information, it is critical that titles be filmed complete. NLM has recently established a borrowing program for volumes held by U.S. libraries and expects soon to begin to arrange borrowing agreements with foreign countries. It is hoped that such international borrowing programs will

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prove to be the starting point for improved communication regarding preservation activities among libraries with significant medical collections throughout the world.

Crucial to the success of the National Plan is a preservation needs assessment of medical libraries that is being conducted this year. Aside from determining the level of preservation activity and expertise in medical libraries, the needs assessment will attempt to determine how much important biomedical literature in deteriorated condition exists that is not held by the National Library of Medicine, and how many libraries will be interested in and able to participate in cooperative microfilming and conservation projects. The results of this study should provide a valuable snapshot of the state of preservation in medical libraries in the United States. It is expected that, once completed, the needs assessment will be of interest well beyond the medical community.

The approach taken by NLM differs from that of the Research Libraries Group in several ways. The primary difference, of course, is that NLM is taking responsibility for preserving most of the biomedical literature. Other medical libraries will not be asked to share the burden to the same extent that RLG libraries must do. The role of the other medical libraries in the country will be to supplement NLM's effort rather than to assume major responsibility for preserving a particular segment of the literature. Moreover, NLM's approach to selecting materials for preservation is quite unique. Rather than selecting for preservation specific important titles

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or subclasses within biomedicine, the Library is filming basically all brittle materials in core medical subjects (i.e., those collected at the comprehensive and research levels).

The role of the National Library of Medicine has to a great extent determined the approach it has taken to preserving the literature. As the library of record for biomedicine in this country, NLM is depended upon by other libraries to provide access to its collection for medical researchers now and in the future. Since it holds the largest concentration of the literature in the country and since funds are available for the purpose, filming all of the deteriorated titles in the NLM collection appears to be the most logical, practical, and efficient way to proceed. In many other disciplines, such an approach would not be feasible because the much larger number of deteriorated materials and lack of funding preclude the possibility that any single library could begin to preserve every brittle title in its collection.

Having looked briefly at two major cooperative programs in this country, the question to be asked is whether they might offer useful information that should be considered as we begin to plan for international preservation efforts. It seems to me that while the National Library of Medicine and the Research Libraries Group have approached their preservation problems in quite different ways, the two programs illustrate several basic principles that should govern any preservation microfilming

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among libraries that we will we able to accomplish the work that needs to be done. There are simply too many volumes in our collections in need of preservation and too little funding for libraries not to work together to ensure that each title is filmed only once. A second principle is that each library engaged in preservation microfilming will provide for every other library access to the titles it films. In this way the benefits of filming programs can be shared by all. Third is the conviction that adequate bibliographic control must be provided for all preserved titles and records must be input promptly into one of national bibliographic data bases so that other libraries will be aware of what has been filmed and duplication of effort will be avoided.

This last issue, access to bibliographic records, is crucial to the success of any international preservation effort. If funding becomes available for the national brittle books program which is being planned by the Commission on Preservation and Access, libraries in the United States will soon be able to increase dramatically the number of titles they film each year. Other new projects just getting under way such as the Research Libraries Group's Great Collections program mean that many more foreign imprints will be filmed than has been true in the past. It will soon become even more important that libraries in other countries have access to records of what is being filmed here and that American libraries have a much better means of finding out about work that is being done elsewhere.

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Fortunately, encouraging progress on this front is already being made. At a meeting held last year in Lisbon, the heads of national libraries from ten Western European countries agreed that first priority should be given to the creation of registers of all documents preserved and available in microform in Europe and that a code should be added to bibliographic records to identify items available in microform or otherwise preserved. Another notable development last year was the agreement by the British library to load records for its microfilms into RLIN, so that duplication of the British Library's filming efforts by American libraries can be avoided. In addition the British Library is exchanging records for microforms with the Bibliotheque Nationale and is working toward establishing an exchange agreement with West Germany. Most recently, the Commission on Preservation and Access has initiated a project to explore the feasibility of an international data base of records for preserved items. The objectives of the study are to survey the national libraries in Great Britain, France, West and East Germany, and Venezuela to determine how many preservation records exist and to identify what would be required if an effort were launched to make them machine readable and compatible so that they could be entered into a common data base. The findings and recommendations of this study should be extremely useful for future planning of international cooperative efforts.

While these developments are certainly a major step in the right direction, it is beginning to be recognized that we must go beyond the international exchange of bibliographic records if we are to be able to address adequately what is, in fact, a global problem. Fortunately,

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discussion has already begun to take place about the possibility of international cooperative filming programs. The 1986 Vienna Conference on Preservation of Library Materials, which was sponsored by the Directors of National Libraries in cooperation with IFLA and UNESCO, resulted in a commitment by participants from thirty countries to develop a worldwide preservation policy and international preservation microfilming standards. The conference was also significant in that it was there that the Core Programme on Preservation and Conservation of the International Federation of Library Associations was officially launched. Among the many goals of the new Programme is that of helping to coordinate international preservation microfilming activities. More recently, representatives of Western European national libraries have begun to discuss possibilities for European cooperation in preservation microfilming and the the members of IFLA's Conservation Section are in the process of reviewing a number of new project areas, including the development of international preservation microfilming standards. As you may remember, central coordination of work and willingness on the part of all participants to follow agreed upon specifications were considered critical elements in planning for the Research Libraries Group and National Library of Medicine projects. They are likely to be important to the success of international cooperative efforts as well.

Admittedly, discussions at the international level of possible cooperative preservation programs are at a very preliminary stage. We have recognized the critical state of many of our collections and we have acknowledged the need for cooperation if the best of the world's

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intellectual output is to be saved. Some of the major issues such as the need to share access to bibliographic records and the need for standards for microfilm production, quality control and storage are just beginning to be addressed. Other questions that eventually must be answered concern what sources of funding will be available for a worldwide preservation effort, how the materials to be preserved will be selected, what division of responsibility should be established, how much local autonomy needs to be retained, and whether worldwide access can be provided once the information has been preserved. These questions and many others are likely to occupy us for a long time to come. It is hoped that the experience of existing cooperative programs such as that of the Research Libraries Group and the National Library of Medicine will prove to be useful as we set about what is a large, extremely challenging, and very vital task.

Margaret M. Byrnes
Head, Preservation Section
National Library of Medicine
June, 1988.

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Library of Congress Preservation Office Deacidification Talk
by

Peter G. Sparks
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The Library of Congress
Washington, D.C.

General Session IVD
Mass Deacidification Program
Friday, 8 July 1988
13:30—14:30

LIBRARY OF CONGRESS PRESERVATION OFFICE
DEACIDIFICATION TALK

April 1988

It is a pleasure for me to be here today today to talk with you about one of the most important issues of our time in libraries, the preservation of our collections. The Library of Congress is making a concerted effort to focus a variety of technologies on solving the preservation challenge in its collections and today I would like to tell you about one 0 of those technologies--mass deacidification of paper. It is our hope that by converting acid paper to alkaline paper that we will prevent a major brittle paper disaster from occurring in our collections within the next twenty years.0 The application of deacidification technology on a very large-scale over this period will preserve millions of volumes for hundreds of years in their original format thus keeping the paper in these books from becoming brittle and requiring costly and time-consuming microfilming.

My presentation will start with some historical background, go beyond into the chemistry of paper degradation, review single page and mass treatment and discuss our activities in mass deacidification at the Library of Congress.0

0 The principles of papermaking have not changed since its invention in China nearly 2,000 years ago.0 The basic ingredient of paper is cellulose fiber which for centuries was obtained from old rags of linen, cotten clothing, and other plant sources. Cellulosic fibers can be 0

separated and processed in water, and dried, to form a tightly woven paper 0 mesh. In the middle of the 19th century the demand for paper had surpassed the supply of rags and 0 hence the gradual conversion to wood pulp papers began. The crushing of the fibers with the mortar and pestle to 0 make pulp became highly automated with the advent of continuous paper making equipment and 0 in the case of better grade book papers it became a chemical process.0 The great speed at which modern papers can be made was achieved at the expense of paper permanence. It is the modern chemistry of pulp and paper production that has introduced the acids that cause paper deterioration.0 Acid producing materials enter the paper in chlorine bleaching and, more seriously, with the introduction of sizing essential to modern printing papers. Earlier paper was sized by dipping in gelatin or natural glue-like mixtures. Modern papers use rosin that is precipitated with a chemical known as alum and which is the principle cause of acidic paper

0 **(HOLD 1 SECOND)**

0 The brittle paper challenge can be summarized as follows. Causes are shown on the left and known solutions on the right. The causes are well understood with the primary culprit identified as alum-rosin sizing. The solutions yield papers whose lifetimes can be measured in centuries rather than decades. Environmental controls are important because the two solutions depend on good conditions for maximum lifetime benefit.

Before discussing deacidification, I would like to say something about an important partial solution--the manufacture of alkaline paper. These papers are made with non-acidic sizing systems, have a built-in $CaCO_3$ alkaline reserve, and use only chemically purified wood pulp. They have excellent lifetime characteristics and will contribute to the overall solution. In the U. S. today, increasing amounts of alkaline papers are being used in the printing of high quality books. At the end of 1984, the American National Standards Institute adopted a standard for paper designed to last several hundred years.0 Called the "American National Standard for Information Sciences -- Permanence of Paper for Printed Library Materials," the standard establishes the criteria for the permanence of uncoated paper, defining pH, alkaline reserve, and freedom from ground wood. The National Information Standards Organization has 0 designed a logo to identify paper conforming to the standard in the form of the symbol for infinity inside a circle.

0 **(Chemistry)**

Now, let's discuss some simple chemistry about why paper becomes brittle from acid attack and how the deacidification agent stops this process.0

The embrittlement process can be best understood by looking at paper and its chemical characteristics at the molecular level. If we start with a sheet of paper and look at the fibers at 0 higher and higher 0 magnifications and 0 continue this process into 0 the world of molecular dimensions we would get to a point where we could see the cellulose chains that are made up of connected rings having specific chemical groups attached to them.0 This chain structure can be idealized to a ball stick model 0 so the cellulose can be viewed as a collection of beads, held together by links in a long chain. It is this long chain characteristic of cellulose that contributes directly to the paper fibers strength. With this in mind, let us leave our mental image of the cellulose molecule and talk about alum rosin sizing.0

Alum is a common name for a compound used in the paper industry known as aluminum sulfate or sometimes referred to as potassium aluminum sulfate. 0 Under the influence of high humidity and warm temperatures alum breaks up into different products by a reaction called hydrolysis. Depending on the type of alum used the products are sulfuric acid and one or two bases. The acid generated from the hydrolysis of alum attacks the cellulose molecule and changes the nature of the various pendant chemical groups on the cellulose chain in a complex series of reactions which eventually 0 lead to the breaking of the chain structure. This chain cutting process yields a paper that is weak and embrittled. To translate this molecular breaking process into more scientific terms we need a graph like the one shown 0 on the next slide. This figure is a plot of paper strength as a function of time in years for a typical high quality paper made from chemically purified wood pulp sized with alum-rosin. This curve

shows that in the paper's early years it is in a strong condition but rapidly falls in a period of several decades to an intermediate strength level where it is of course still quite usable and weakening would not be detected by the naked eye. After many, many decades the strength of the paper slowly decreases to the level where it would become brittle and require microfilming. This type of behavior is typical for all acid papers whether they are made from chemically purified pulp or ground wood pulp. The latter simply degrades faster and the brittle region plateau is reached much sooner.

The application of a deacidification agent to the paper inhibits this chain breaking process.0 These agents are usually chemical compounds called bicarbonates/carbonates or oxides which react directly with the free acid in the paper, producing through a series of reactions the harmless salt of the acid, carbon dioxide gas and water. Thus, a simple chemical reaction between the deacidification agent and the free acid in the paper prevents the acid from attacking and cutting the cellulose chain.

Deacidification has a variable benefit when applied to papers having different strength values at the time of treatment.0 The degree of benefit for a typical paper is shown on the next slide. Here we see a graph of paper strength or MIT fold endurance versus the life expectancy of the paper in years. This data is obtained by accelerated aging testing of the paper at 90^{0}C and 50% relative humidity. Comparing the life expectancy of the untreated control with that of the zinc oxide treated kraft paper we see that the life expectancy of the untreated control is about 70 years and

the life expectancy of the same paper treated with 1.3% zinc oxide is about 350 years. Thus the untreated paper has had its life expectancy increased by a factor of 5 times due to deacidification.

O If we return to our graph showing paper strength versus time and look at the variable benefit of deacidification we would see that strong papers gain a high benefit from deacidification. The reason for this is that the factor of 5 multiplies by the high life expectancy of the strong paper at the time of treatment, therefore the life expectancy of the treated paper is much greater. On the other hand if we look at a very weak or brittle paper its life expectancy is low and even though deacidification would also be multiplying its very small life expectancy by a factor of 5 this will yield a small number of years that deacidification will add to its lifetime. In between with moderate to weak papers the benefit varies depending on the strength of the paper before it was deacidified. In summary then, deacidification has the highest benefit for strong papers and virtually no benefit for weak papers. It does, however, hold these papers in their weakened condition and does not let them get any worse.

O Now, I would like to discuss some general ideas about deacidification, deal briefly with single page treatment and then move on to mass treatment.O All successful deacidification processes whether they are single sheet or mass techniques have fundamental similarities. In all processes the agent is first brought into intimate contact with the paper material. In single sheet processes the agent is dissolved in as liquid and brought into contact with the paper in this vehicle. In the mass processes one sees both liquid and gas phase contact.

Secondly, the deacidification agent chemically neutralizes all the existing free acid in the paper.

Thirdly, an alkaline reserve is left in the paper,

and, finally, all liquids or reaction by-products are removed from the paper before it is returned to circulation.0

(HOLD 2 SECONDS) 0

There are a number of deacidification processes that have been used and experimented with in the last 20 years and the more important ones are shown on this slide. The processes in bright yellow have been used for single page deacidification, while the orange colored process have been used in mass deacidification and one has been used in both.0

Single page deacidification is usually applied to rare and 0 important items and done by, or under, the guidance of a trained conservator. The technique cannot be applied efficiently to thousands of items at once although with similar materials one can develop limited production techniques.0

The attempt to find an approach for treating great numbers of items at the same time has led to considerable research and development during the last 10 years. The objective of this research has been to develop a chemically sound process that is cost effective and which can treat hundreds of thousands of items in a given year.0

The Library of Congress in an exhaustive research program spanning a seven year period, has chosen a gas phase process using a material called diethyl zinc or "DEZ" for short.0 This process has been demonstrated at the lab bench and 0 in small-scale runs at General Electric Corporation in the early 80's

0 We worked with NASA's Goddard Space Flight Center for four years to buy the engineering 0 required to test the process using a chamber that will hold 5,000 books. Additional trials and experimentation was done at NASA on a smaller scale.

The diethyl zinc gas diffusion process is carried out in three stages. First the residual water in the book is carefully lowered so that the correct amount of water is present to react with the DEZ to form the alkaline reserve. Once this is completed in about 18 hours, DEZ is introduced at low pressure into the chamber as a gas and left to permeate the paper, react with the water and neutralize excess acid for a period of about 10 hours. In the post-treatment stage water is re-absorbed into the paper. The books sit in a rehumidification room for about 1-2 days to regain more of their equilibrium water content.0

The Library of Congress is developing plans for implementing the diethyl zinc process on a large-scale. Our best case plan at its present level of development is an operational treatment plant by mid-1990.

Engineering activities currently center around the operation of a pilot plant to obtain information that will allow us to scale-up to the full scale facility. The pilot facility at the Texas Alkyls plant near Houston, Texas has been in operation since January 1988..

(Explain Texas Alkyls Slides 000000)

0 In summary let me leave you with some encouraging words about 0 deacidification as a promising approach to keeping the "book" available in libraries and 0 preventing costly microfilming of brittle materials.0 The brittle paper challenge in front of us has been clearly defined. We know why paper becomes brittle and have identified several solutions to 0 prevent this from happening. Manufacture of alkaline paper and 0 the mass deacidification of library materials to make them alkaline appear to be the promising solutions to extend the permanence of stronger papers.

This combination of technologies can provide the team work to 0 solve this important worldwide challenge by the end of this century.0

Thank you.